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Short-term trends in Dutch children's attention problems

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Abstract Changes in the prevalence of attention problems in Dutch children were examined by a comparison of prevalence rates in 1988 and 1993. On both occasions a representative sample of fourth-grade children from 82 regular elementary schools participated in the study. Both teacher reports and scores on an attention test indicated a small decrease in attention problems. We also found that the prevalence of

other behavioral/emotional and reading problems had decreased or had remained unchanged. Subject to the limitations of the study, we concluded that the attention problems of fourth-grade Dutch children are not worsening.

Key words Epidemiology – attention problems – assessment – Dutch children

Introduction

Whether the prevalence of children with attention problems is increasing, is a topic of great concern in education and for society at large. A negative relationship has usually been found between attention problems and school achievement (6, 18, 34). Children with attention problems can be an extra burden in teachers' classroom management and possibly as a consequence these children are referred more often to special education services and mental health services (7, 36). Attention deficits are also one of the key symptoms of the clinical syndrome of attention deficit hyperactivity disorder (8), which appears to be a risk factor for psychopathology in adult age (4, 5). Epidemiological researchers have primarily investigated the prevalence of attention problems and other behavioral problems at one and the same time (see for a review: 49) and the consequences of these problems in the long run (31, 36, 48, 50). To date, only two studies have been published regarding changes in prevalence rates over several years. Rahim and Cederblad (43) reported that the prevalence of behavioral/emotional problems among children of 3 to 15 years old from three villages in the neighbourhood of Khartoum (Sudan) was higher in 1980 than in 1965.

The largest increase of behavioral/emotional problems was found among schoolboys and concerned, among other behaviors, a large increase in hyperactive behavior. According to Rahim and Cederblad these differences could be attributed to changes in the judgement of the rated behaviors, to an ongoing process of urbanisation, and to changes in the tribal composition of the population of the three villages.

More recently, Achenbach and Howell (2) reported on changes in behavioral/emotional problems in 7-to 16-year-old children in the USA. Using Child Behavior Checklist (CBCL) ratings provided by parents, they found an increase in reported problems between 1989 and 1976, i.e., over 13 years. These increases were detected on all behavior scales, including the scale for Attention Problems. On the basis of teacher ratings on the CBCL Teacher Report Form (TRF), Achenbach and Howell detected a comparable increase in behavioral/emotional problems over the period between 1982 and 1989. Although these increases were significant, they were nevertheless, as Achenbach and Howell qualified, small.

In the present study we examined short-term trends in the prevalence of attention problems among Dutch schoolchildren. The study was confined to fourth-grade

elementary schoolchildren and encompassed a period of five years. As elementary school in the Netherlands spans six years, this period is about one school generation. Despite a paucity of epidemiological data on changes in the prevalence of attention problems in the Netherlands, over 80 percent of teachers in Dutch elementary schools believe that the number of children with attention problems is on the increase (20, 25). Given these teachers' impressions and the results of Rahim and Cederblad (43) and Achenbach and Howell (2), we expected that the number of children with attention problems would have increased over the five-year period.

As in most epidemiological studies on behavioral/emotional problems, the results presented by Rahim and Cederblad (43) and by Achenbach and Howell (2) are based on behavior ratings provided by parents and/or teachers. Although standardized behavior checklists may be considered indispensable to epidemiological research, they have the disadvantage that informants' behavior ratings can be sensitive to norm differences. Increases in behavioral/emotional problems over a certain period of time might be due to a decrease in tolerance towards a number of these problems. With this difficulty in mind, it would therefore be desirable to include instruments that are insensitive to informants' subjective norms. With respect to attention problems, another disadvantage of behavior ratings ought to be mentioned. The concept of attention refers both to behavior and to cognitive task performance. Of course, attention behavior ratings cannot capture the cognitive aspects of the concept of attention. For these reasons, we employed in the present study both attention behavior ratings and a test for the assessment of attention problems.

There is little dispute over the principle forms of behavior indicating attention behavior problems. There is less agreement on the cognitive aspects of attention. In recent theories of attention, however, researchers have emphasized its regulative function in information processing (33, 39, 40, 41, 46). For the present study we have restricted attention, further denoted as attention regulation, to the ability to regulate processes in working memory. Working memory is a system for the temporary storage and processing of information and has been found to be involved in a broad range of everyday cognitive tasks (9). In a well-accepted model of working memory, i.e., the Baddeley and Hitch model (9, 11), part of working memory function is explicitly associated with attention (10, 12).

In the present study we examined changes in the prevalence of problems of attention behavior and attention regulation in fourth-grade children in regular Dutch elementary schools between 1988 and 1993. In addition, we registered the prevalence of other related behavioral/emotional problems (namely hyperactive or restless behavior problems, aggressive behavior problems and

fear/uncertainty problems, and problems in reading comprehension) to investigate the specificity of changes in attention problems.

Method

Description of samples

On both occasions (1988 and 1993) a sample was drawn of Dutch fourth grade children from regular elementary schools¹. Approximately 93.5% of children in the Netherlands are educated in regular elementary schools (15, 16). Referral to special education services mostly occurs before the end of grade 3.

In 1988 a multistage sampling procedure was applied (35, 49). First, a sample of 101 schools was drawn from the population of elementary schools. Next, 10 children per school were drawn. In 1993 the same sample of schools was approached. Schools that refused to participate again were replaced. As in 1988, 10 fourth-grade children per school were randomly selected.

In the first stage of the multistage sampling procedure, a weighted and stratified sample of schools was drawn from the population of elementary schools in 1986². Two variables were used for stratification: whether the school was situated in an urbanised area (yes or no) and whether the school received extra financial support (yes or no). The latter variable is an indicator of the socio-cultural background of the population of the school. Schools with a high percentage of children from families that belong to ethnic minorities and/or have low socio-economic status receive extra financial support. Thus, four strata were made.

Per stratum, a number of schools were drawn such that the strata sample sizes were made proportional to the strata population sizes. Each school was given a sampling probability proportional to its number of children to ensure that each child in the population had an equal sampling probability. The sampling probability of a school was based on the number of children aged 7 years attending the school in 1986. This number appeared to be a good proxy variable for the number of children in grade 4 in 1988. In the sample of 1988 the correlation between the number of children aged 7 years in 1986 and the number of children in the selected grade 4 in 1988 was 0.91. For reasons that do not pertain to this paper, 9 extra schools were drawn from urbanized areas (see 22), making a total of 110

¹ In the Dutch school system children go to kindergarten at the age of four. Grade 1 is entered at the age of six.

² At the beginning of 1988, the time that we started the preparations for the study to be conducted at the end of 1988, the relevant data for the population of schools for the school year 1988/1989 were not yet available. The most recent data were from the school year 1986/1987.

Table 1 Characteristics of the samples

	1988	1993
N of schools	82	82
N of children	807	809
% of Boys	49.1	50.1
% Caucasian	89.0	83.6
Age (in months)	117.0	117.2

schools. Because schools in the sample of 110 schools could refuse to take part in the study two extra samples of 110 schools were drawn. Each school in the first sample was matched to a school in the second and the third sample. A school in another sample was approached whenever a school in the first sample refused to participate in the study. We had to approach 204 schools in order to obtain a sample of 110 schools. Thus, the response percentage was 53.9%. This percentage was approximately equal in all strata. Excluding the 9 extra schools, the sample of 1988 consisted of 101 schools.

In 1993 we approached the same sample of 101 schools (110 schools minus the 9 extra schools) to take part in the study. From the sample of 101 schools that took part in the study in 1988, 82 schools (i.e., 81.2%) were willing to participate again in 1993. Each of the 19 schools that refused was replaced by a matched school from one of the other samples of schools. Thus, in 1988 and in 1993 101 schools participated in the study. We will restrict our analyses, however, to the 82 schools that participated on both occasions.

In the second sampling stage (in 1988 and in 1993), 10 fourth-grade children were randomly drawn from the children that were at school on the day of testing. None of the children refused to participate in the study. A minority of the schools had more than one fourth-grade class. In those cases the largest class was selected and 10 children were randomly drawn from this class³. By contrast, in some schools less than 10 children were in the fourth-grade.

Some general characteristics of the samples (1988 and 1993) are presented in Table 1. As can be seen in the table, the percentage of boys in the sample of 1988 was slightly lower than in the sample of 1993 (mean difference is 1%). However, a z-test for the difference between two proportions revealed that the difference was not significant, $z = -1.28$, $p > 0.05$. In contrast, the percentage of Caucasians was significantly higher in 1988 than in 1993 (mean difference is 5.4%), $z = 3.15$, $p < 0.01$. The mean age in both samples was virtually equal.

³ One class was selected because the test for attention regulation was administered to entire classes, and administration of the test to all grade 4 classes of a school was deemed too costly.

Instruments

Amsterdam child behavior list

The Amsterdam Child Behavior Checklist (ACBL) (21, 23, 27) is a relatively short behavior checklist for children meant to distinguish between three externalizing problems (Attention Behavior, Restlessness, and Aggressive Behavior) and one internalizing problem (Fear/Uncertainty). The list has 33 items. Each item contains a description of a behavioral or emotional problem and a rating scale on which its applicability for a child can be indicated. The scale points range from *does not fit, fits a little, fits quite well* to *fits (nearly) completely*.

The teacher version of the list has four scales: Attention Behavior (7 items), Restlessness (4 items), Aggressive Behavior (6 items), and Fear/Uncertainty (4 items). The quality of the scales is satisfactory. The reliability (Cronbach's α) of the scales for attention behavior, restlessness, aggressive behavior, and fear/uncertainty are 0.91, 0.81, 0.80 and 0.77, respectively (23). The validity of the scales is supported by several results. Substantial correlations were found between the attention behavior scale and several attention tests (21). In addition, in a recent study (23) the ACBL-scales attention behavior and aggressive behavior appeared to be highly related to the corresponding scales (Attention Problems and Aggressive Behavior) of the Dutch version of the Teacher's Report Form (TRF) of the Child Behavior Checklist (CBCL) (1). In addition, substantial correlations were found between restlessness and the TRF-scales attention problems and aggressive behavior. The relation between fear/uncertainty and the TRF scales withdrawn and anxious/depressed was moderate.

Star Counting Test

The Star Counting Test (SCT) (24, 26, 29, 30) is aimed at measuring the regulatory function of attention. Results, thus far, have supported the validity of the test. The scores on the test have been found to be related to the scale Attention Behavior of the ACBL, while the associations with the other scales of the ACBL were significantly lower (26). Similarly, De Jong (24) reported that the relation of the SCT with the scale Attention Problems of the Teacher's Report Form of the CBCL (1) was substantially higher than its associations with the other scales of the TRF. Finally, it was shown that children with relatively pure attention problems, i.e. is without conduct problems, could be differentiated from normal controls using the test (24).

The SCT is based on Baddeley and Hitch's working memory model (9, 11). The SCT requires the regulation of a very simple process, namely counting, which is known to involve working memory (37). More specifi-

cally, the SCT requires the alternation of forward and backward counting.

Each item in the test consists of 9 rows of three to five stars each (approximately 40 stars in total), with plus and minus signs between them and a number at the beginning of the first row (see for an example De Jong and Das-Smaal (26)). The task is to count the stars from left to right and from top to bottom starting from the number in front of the item. Each item has a different starting number. The signs indicate the direction (forward or backward) in which subsequent stars have to be counted. Thus, the test requires alternating forward and backward counting until the last star is reached. An item always starts with forward counting. The number of the last star is the answer to the item.

The test consists of two parts, which have to be administered separately. In the first part, which consists of 12 items, a plus sign indicates forward counting, while a minus sign denotes backward counting. In the 10 items of the second part of the test the meaning of the signs is reversed, implying backward counting after a plus and forward counting after a minus sign.

The test is administered to groups of children and can, therefore, be used efficiently in large-scale assessment studies. For practical reasons the amount of time allotted to complete the test is limited. The first part of the test has to be finished in 12 minutes, the second part has to be completed in 10 minutes. In principle the score on the test is the total number of items (maximum 22) correct on the complete test. In case a child did not complete all items, however, a score was derived for the situation in which all items had been made. This score was computed as the proportion of items correct (i.e., the number of items correct divided by the number of items completed) multiplied by the number of items in the test, i.e., 22 (for further rationale of this method of scoring see De Jong and Das-Smaal (30)).

The test has three versions. All versions were administered in the present study. The versions can be considered as parallel and their score distributions have approximately equal means and standard deviations (24, 26). Thus, the scores on either version are roughly equivalent.

Reading comprehension

The test 'Lees en Begrijp' (17) is a regularly used school achievement test in the Netherlands. The test consisted of five stories containing 13 to 33 sentences. Each story was followed by several multiple-choice items. The complete test had 25 items.

Procedure

On the first occasion in November 1988, the SCT was administered to entire fourth-grade classes by trained test assistants. Due to financial constraints, on the second occasion in November 1993 trained test assistants could be sent only to a random group of 25 schools. At the other schools the SCT was administered by the teacher of grade 4. On both occasions, the three versions of the test were randomized over three groups within classes. Teacher ratings were made for each child in grade 4 in the same week that the SCT was administered.

Statistical methods

The two-stage sampling procedure used in the present study implicates that the children are nested in classes. Consequently, the scores of the children in one class are not independent (32). To take account of the nested structure of the data, we performed hierarchical regression analysis (also denoted as multi-level analysis), which has been specifically developed for this type of data (14, 32). The theoretical background of the technique and its application are extensively described elsewhere (e.g., 14, 32) and will not be repeated here. The main point is, however, that hierarchical regression analysis provides the opportunity to model separately the variance at the level of the school and at the level of the child. Consequently, the standard errors of the regression parameters are correct, which is not the case for ordinary regression analysis of hierarchical data. The hierarchical regression analyses were performed using the program ML3 (42).

Results

The results reported are based on the sample of children from the 82 schools that took part in the study on both occasions (1988 and 1993). On each occasion, however, 101 schools were involved, due to the fact that 19 schools of the 1988 sample were replaced in 1993. The results based on the total samples of 101 schools are virtually identical to the results that are reported below (for details see De Jong (22)).

Before we present the results two issues are considered. One issue concerns the differences between the 82 schools of the 1988 sample that participated again in 1993 and the 19 schools that refused to take part in the follow-up study. Hierarchical regression analyses of the 1988 sample did not show any significant mean score differences on the relevant variables (behavior-ratings and test scores) between the children of the schools that did and the children of those that did not participate

Table 2 Means and standard deviations on the scales of the Amsterdam Child Behavior Checklist and on the tests for attention regulation and reading comprehension

	1988			1993		
	Boys	Girls	Total	Boys	Girls	Total
Behavior scales						
Attention						
M	8.46	7.33	7.88	7.89	6.61	7.24
SD	5.64	5.47	5.58	5.67	5.13	5.44
Restlessness						
M	3.79	2.52	3.15	3.59	2.31	2.94
SD	3.32	2.69	3.32	3.39	2.59	3.07
Aggressive						
M	2.74	1.35	2.03	2.74	1.30	2.01
SD	3.66	2.45	3.18	3.66	2.24	3.11
Fear/uncertainty						
M	3.18	3.45	3.32	2.64	3.14	2.89
SD	2.72	2.88	2.81	2.57	2.68	2.64
Tests						
Attention Regulation						
M	13.01	14.31	13.67	13.43	14.93	14.18
SD	4.74	4.73	4.78	5.09	4.30	4.77
Reading Comprehension						
M	17.89	18.01	17.95	18.34	19.01	18.68
SD	4.96	4.56	4.76	5.01	4.58	4.81

Note: On the behavior scales a higher score indicates more problems, while on the tests a higher score means a better performance

again in 1993. In addition, the characteristics of the children from the total sample of 101 schools in 1988 were very similar to the characteristics of the sample of children from the 82 schools that took part on both occasions (see De Jong (22)). Thus, the children of the 82 schools that participated on both occasions appeared to be representative for the children of the total sample in 1988.

Another issue concerns the administration of the SCT in 1988 and in 1993. In 1988 the SCT was administered by test assistants, while in 1993 this was only the case for a random 25% of the schools. At the other schools of the 1993 sample the test was administered by the teacher. An hierarchical regression analysis of the total sample in 1993 (i.e., the children from 101 schools) revealed, however, that the difference between administration by teachers and test assistants was not significant (for details see De Jong (22)).

Means and standard deviations of the scores on the scales of the ACBL and on the tests for attention regulation and reading comprehension for the 1988 and the 1993 sample are given in Table 2. Note that on all scales of the ACBL, a higher score means more problem behavior. Hierarchical regression analyses were performed to test for differences between the mean scale scores in 1988 and 1993. In addition to the year (coded as 0 for 1988 and 1 for 1993), age of the child, ethnicity (Dutch or non Dutch), and sex (boy or girl) were

Table 3 Unstandardized regression estimates of the predictors on the scales of the Amsterdam Child Behavior Checklist and on the tests for attention regulation and reading comprehension

	Age	Sex	Ethnic	Year
Behavior scales				
Attention	0.14**	-0.20**	0.19*	-0.14*
Restlessness	0.07**	-0.39**	0.06	-0.08
Aggressiveness	0.06*	-0.45**	0.11	-0.02
Fear/uncertainty	0.06*	0.11*	0.06	-0.15 ⁺
Tests				
Attention Regulation	-0.09**	0.26**	-0.04	0.12*
Reading Comprehension	-0.10**	0.04	-0.52**	0.18*

Note 1: On the behavior scales a higher score indicates more problems, while on the tests a higher score means a better performance

Note 2: Sex: Boys are 0, girls are 1; Ethnicity: Dutch is 0, non Dutch is 1; Year: 1988 is 0, 1993 is 1.

⁺ p<0.10. * p<0.05. ** p<0.01. Two-sided tests

entered as covariates in the analyses. Some additional remarks concerning these analyses should be made. First, the analyses were performed on the standardized scale or test scores. As a consequence the unstandardized regression parameter of the variable year indicates the number of standard deviations with which the mean score in 1988 differs from the mean score in 1993, after both mean scores have been corrected for the contribution of the covariates. Thus, this parameter can be interpreted as Cohen's measure *d* for effect size (19). Values of 0 to 0.30 are considered small, values of 0.30 to 0.50 are medium and values larger than 0.50 are large. A second remark is that we used two-sided tests, since no solid hypotheses about the direction of the effects could be derived. Finally, all analyses started with the full model, i.e., with all interactions between the predictors included in the regression equation. None of these interactions, however, reached significance.

The results of the hierarchical regression analyses are presented in Table 3. The results of prime interest concern the mean score differences between 1988 and 1993. The mean score on the attention behavior scale appeared to be significantly lower in 1993 than in 1988. Thus, the mean level of attention problems decreased from 1988 to 1993, although the effect should be considered small in terms of Cohen's criteria for effect sizes. A similar small, but significant, effect was found for attention regulation, indicating a small increase in the performance on the SCT from 1988 to 1993. On the other behavior scales, restlessness, aggressive behavior, and fear/uncertainty, no significant differences appeared between the mean score in 1988 and in 1993, although on the fear/uncertainty scale a trend toward a decrease in problem behavior could be observed. Finally, a significant increase was found in the performance on the test for reading comprehension between 1988 and 1993.

Some other results reported in Table 3 are noteworthy. Firstly, girls tended to have significantly fewer attention problems, as signified by both attention behavior and attention regulation, than boys. In addition, girls were found to manifest significantly less restlessness and aggressive behavior, but tended to exhibit significantly more fear and uncertainty. Secondly, with the exception of attention behavior and reading comprehension, the effects of ethnicity appeared to be negligible. Children from non-Dutch families manifested significantly more attention behavior problems and had lower scores on the test for reading comprehension. The latter result is probably due to the fact that Dutch is not the native language for these children. Finally, older children appeared to exhibit significantly more behavior problems and lower test performance than younger children.

Discussion

The main aim of the present study was to examine short-term changes in the prevalence of attention problems in elementary schoolchildren in the Netherlands. The results showed a slight increase in the mean level of attention behavior and attention regulation between 1988 and 1993. In addition, no significant differences were found between 1988 and 1993 for restless or aggressive behavior, while there was a trend towards a decrease in fear/uncertainty problems. With regard to reading comprehension, the mean performance in 1993 was slightly better than in 1988.

In 1988 and in 1993 the same schools participated in the study, but the children in the sample were different. An important issue is whether the 1988 and the 1993 samples are similar, irrespective of the exact representativeness of the samples for the population. This issue is important because if the schools in our 1988 sample would have changed dramatically between 1988 and 1993, while others that are not in the sample did not, then the sample of 1993 would have been representative for a different part of the population than the 1988 sample. However, this does not seem to be the case. School size (on which the sampling probability of the schools was based) and the characteristics of a school population (such as percentage of girls, percentage of ethnic minorities) are not likely to have changed very much over a five-year period. Changes that were found, i.e., an increase in children from minority groups, are similar to the changes in the population. Therefore, the representativeness of the samples appears to be similar (for a more extensive outline of this argument see De Jong (22)). Consequently, a comparison of the relevant outcome variables of the 1988 and the 1993 sample is warranted.

Another issue concerns the extent to which the samples are representative for the population of Dutch

fourth-grade elementary school children. The available data do not indicate that the samples are grossly biased. Comparison of the sample data with the population data on sex, ethnicity, and SES did not reveal any significant differences (22). In addition, children from the schools that refused to participate in 1993 did not differ on any of the relevant variables from the children of schools that did participate in 1993. Although the latter finding does not rule out that the 1988 sample might have been biased, the drop out was clearly not tied to schools with particular children.

Although a comparison of the samples seems to be warranted, the interpretation of the results of this study is subject to several limitations. An obvious limitation concerns the relatively short time period of five years. As a result, it is not clear whether the changes found reflect a temporary trend or whether they will be inclined to persist in future years. A follow-up study in five years is desirable.

Another limitation of the present study is the use of one grade cohort. There is a risk that the observed changes might be specific for this particular cohort rather than reflecting a general trend. Unfortunately, no data are available in the Netherlands with which to examine the extent to which the grade 4 cohorts of 1988 and 1993 deviate from other cohorts. However, some trends found in other Dutch studies can be mentioned. In a longitudinal multi-cohort study by Mulder (38) in which grade 2, grade 4, and grade 6 cohorts were assessed in 1988, 1990, and 1992, small and unstable differences were found between the cohorts with respect to reading and arithmetic achievement. In addition, over the years a small increase in the scores on a verbal intelligence test was found. A similar increase was reported by Bokhove et al. (13) in the arithmetic achievement of Dutch grade 6 children between 1987 and 1992. The data that are available, therefore, are in line with the results of the present study and do not support the contention that a cohort effect could account for the pattern of changes found in this study.

Besides these major limitations, two other limitations should be mentioned. First, we did not incorporate a second stage in which more definitive diagnostic information is obtained about specific psychiatric disorders (44). The present study was focused primarily on changes in the mean level of attention behavior and a number of additional behaviors. In principal, specific disorders such as ADHD and conduct disorders might have increased, while the mean levels of associated behaviors such as attention behavior, restless behavior, and aggressive behavior decreased or remained the same.

Secondly, most of the results are based on teachers' observations. Parents were not used as informants. Given the low agreement between informants (3) it is not certain that the use of other informants would have led

to the same results. However, in the study by Achenbach and Howell (2) teacher ratings and parent ratings showed similar results. Instead of multiple informants, we used an objective test, the SCT, as an alternative measure of attention problems. The results of the SCT and the attention behavior ratings by the teachers were identical. The SCT measures the ability to regulate processes in working memory. Factor analysis of standard attention tests has repeatedly shown a short-term memory or working memory factor (28, 45, 47). However, it should be noted that other dimensions of attention have also been established, which might be of interest for future research on the prevalence of attention problems.

Given the limitations mentioned above, it is premature to conclude from the results of the present study that attention problems in the Netherlands are decreasing. However, it is clear that for the moment the significant decrease found in this study in combination with the absence of a downward trend on achievement in other Dutch studies offers little support for the contention that attention problems in the normal population of Dutch elementary school children have worsened.

A straightforward explanation for this result could be a change in referral policy. The drop in attention problems in regular education would then be due to the fact that children with attention problems were being referred more readily to special education. It is difficult to conceive, however, that a referral policy could be tied to such specific problem behavior and would have no effects on related problem behaviors such as restlessness and aggressiveness. In addition, it should be noted that Dutch governmental policy since 1990 (51) has moved in exactly the opposite direction. However, despite this governmental policy, there was indeed a slight increase between 1988 and 1993 in the referral rate to special education for children of nine and ten years of age, the dominant age groups in this study. The increase, however, was primarily due to the growth of schools for the mentally retarded. The referral rate to schools for children with behavioral/emotional problems did not increase, and actually decreased slightly (16). An explanation of the decrease of attention problems in elementary schools in terms of changes in referral policy seems therefore unlikely.

The decrease in attention problems is not in agreement with the results of previous studies. Both Rahim

and Cederblad (43) and Achenbach and Howell (2) reported an increase in attention problems, and in behavioral/emotional problems in general, in the Sudan and the USA, respectively. The increase in behavioral/emotional problems among Sudanese children could be attributed to urbanization and to tribal changes in the population. Such changes, in the opposite direction, did not occur in the Dutch society between 1988 and 1993. Rahim and Cederblad also suggested that parents' perceptions of problem behavior might have changed. Achenbach and Howell (2) offered no explanation for the aggravation of children's problems. Although their results are in accordance with other trends in the USA, for example an increase in referral rates to mental health services, they might also reflect in part a decreasing tolerance towards behavioral/emotional problems.

Accordingly, one might ask whether the slight decrease in attention problems in the present study could be explained by a general increase in tolerance towards behavioral/emotional problems. This interpretation of the results, however, does not seem very likely. One reason is that the results for attention behavior and for attention regulation were very similar. Attention regulation was measured by a standardized test, which might be considered insensitive to changes in tolerance level. Another reason is that the observed changes were primarily restricted to the prevalence of attention problems. If these changes reflected a general trend with respect to behavioral/emotional problems similar differences should have been found in other problem behaviors.

To summarize the present study, a decrease in attention problems of Dutch children was observed over a period of five years. During this period no changes were found with respect to restlessness, aggressive behavior, and fear/uncertainty. To date, therefore, we have not found evidence that attention problems and some other behavioral and emotional problems of Dutch children are worsening.

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References

1. Achenbach TM (1991) Manual for the Teacher's Report Form and 1991 Profile. Burlington VT: University of Vermont, Department of Psychiatry
2. Achenbach TM, Howell MS (1993) Are American children's problems getting worse? A 13-year comparison. *Journal of the American Academy of Child and Adolescence Psychiatry* 32:1145-1154
3. Achenbach TM, McConaughy SH, Howell CT (1987) Child/adolescent behavioral and emotional problems: Implications of cross-informant correlations for situational specificity. *Psychological Bulletin* 101:213-232
4. Af Klinteberg B, Andersson T, Magnusson D, Stattin H (1993) Hyperactive behavior in childhood as related to subsequent alcohol problems and violent offending: a longitudinal study of male subjects. *Personality and Individual Differences* 15:381-388

5. Af Klinteberg B, Schalling D, Magnusson D (1990) Childhood behaviour and adult personality in male and female subjects. *European Journal of Personality* 4:57-71
6. Alexander KL, Entwistle DR, Dauber SL (1993) First-grade classroom behavior: Its short- and long-term consequences for school performance. *Child Development* 64:801-814
7. Algozzine D, Ysseldyke JE (1986) The future of the LD field: Screening and diagnosis. *Journal of Learning Disabilities* 19:394-398
8. American Psychiatric Association (1987) Diagnostic and statistical manual of mental disorders (3rd ed rev). Washington DC: Author
9. Baddeley AD (1986) Working memory. Oxford: Clarendon Press
10. Baddeley AD (1993) Working memory or working attention? In Baddeley AD, Weiskrantz L (Eds) Attention: Selection Awareness and Control (pp 152-170). Oxford: Oxford University Press
11. Baddeley AD, Hitch GJ (1974) Working memory. In: Bower GH (Ed) The Psychology of Learning and Motivation. Volume 8 (pp 47-90). New York: Academic Press
12. Baddeley AD, Wilson B (1988) Frontal amnesia and the Dysexecutive Syndrome. *Brain and Cognition* 77:212-230
13. Bokhove J, van der Schoot F, Eggen T (1996) Balans van het reken/wiskunde onderwijs aan het einde van de basisschool II. Arnhem: Cito
14. Bryk AS, Raudenbush SW (1992) Hierarchical linear models for social and behavioral research: Applications and data analysis methods. Newbury Park CA: Sage
15. CBS (Central Statistical Office) (1989) Statistiek van het basisonderwijs het speciaal onderwijs en het voortgezet speciaal onderwijs. Rijswijk: CBS
16. CBS (Central Statistical Office) (1993) Statistiek van het basisonderwijs het speciaal onderwijs en het voortgezet speciaal onderwijs. Rijswijk: CBS
17. Cito (National Institute for Educational Measurement) (1981) Begrijpend lezen leerjaar 3 4 and 5 basisonderwijs. Arnhem: Cito
18. Cobb JA (1972) Relationship of discrete classroom behaviors to fourth-grade academic achievement. *Journal of Educational Psychology* 63:74-80
19. Cohen J (1988) Statistical power analysis for the behavioral sciences. San Diego CA: Academic Press
20. Das-Smaal EA, De Leeuw LD, Orlebeke JF (1987) Is er iets mis met de aandacht van het schoolkind? *Pedagogische Studiën* 64:1-15
21. De Jong PF (1991) Het meten van aandacht. Delft: Eburon
22. De Jong PF (1994) Concentratieproblemen onder leerlingen van de basisschool: is er een toename? Internal report Vrije Universiteit Amsterdam
23. De Jong PF (1995a) Validity of the Amsterdam Child Behavior Checklist: A short rating scale for children. *Psychological Reports* 77:1139-1144
24. De Jong PF (1995b) Assessment of attention: Further validation of the Star Counting Test. *European Journal of Psychological Assessment* 11:89-97
25. De Jong PF, Das-Smaal EA (1989) Het landelijk onderzoek naar concentratieproblemen onder leerlingen in het basisonderwijs: een verslag voor de leerkrachten. Amsterdam: Vrije Universiteit
26. De Jong PF, Das-Smaal EA (1990) The Star Counting Test: An attention test for children. *Personality and Individual Differences* 11:597-604
27. De Jong PF, Das-Smaal EA (1991) De Amsterdamse Kindergedragslijst: een korte gedragsbeoordelings-lijst voor kinderen. *Nederlands Tijdschrift voor de Psychologie* 46:76-83
28. De Jong PF, Das-Smaal EA (1993a) Factor structure of standard attention tests for children: A distinction between perceptual speed and working memory. *European Journal of Psychological Assessment* 9:94-106
29. De Jong PF, Das-Smaal EA (1993b) Teltest: aandachtstest bestemd voor groep 6 van het basisonderwijs. Nijmegen: Berkhout BV
30. De Jong PF, Das-Smaal EA (1995) Attention and intelligence: The validation of the Star Counting Test. *Journal of Educational Psychology* 87:80-92
31. Esser G, Smidt MH, Woerner W (1990) Epidemiology and course of psychiatric disorders in school-age children: Results of a longitudinal study. *Journal of Child Psychology and Psychiatry* 31:243-263
32. Goldstein H (1987) Multilevel models in educational and social research. New York: Oxford University Press
33. Gopher D (1993) The skill of attention control: Acquisition and execution of attention strategies. In: Meyer DE, Kornblum S (Eds) Attention and Performance XV (pp 299-322). Cambridge Mass: MIT Press
34. Horn WF, Packard T (1985) Early identification of learning problems: A meta-analysis. *Journal of Educational Psychology* 77:597-607
35. Kish L (1965) Survey sampling. New York: John Wiley & Sons
36. Koot HM, Verhulst FC (1992) Prediction of children's referral to mental health and special education services from earlier adjustment. *Journal of Child Psychology and Psychiatry* 33:717-729
37. Logie RH, Baddeley AD (1987) Cognitive processes in counting. *Journal of Experimental Psychology: Learning Memory and Cognition* 13:310-326
38. Mulder L (1994) De derde fase van de OVB-cohort-onderzoeken in het basisonderwijs: het leerlingenonderzoek in schooljaar 1992-1993. Nijmegen: ITS
39. Navon D (1989a) The importance of being visible: On the role of attention in a mind viewed as an anarchic intelligence system I Basic tenets. *European Journal of Cognitive Psychology* 1:191-213
40. Navon D (1989b) The importance of being visible: On the role of attention in a mind viewed as an anarchic intelligence system II Application to the field of attention. *European Journal of Cognitive Psychology* 1:215-233
41. Neumann O (1987) Beyond capacity: A functional view of attention. In Heuer H, Sanders AF (Eds) Perspectives on perception and action (pp 361-394). Hillsdale NJ: Lawrence Erlbaum
42. Prosser RR, Rasbash J, Goldstein H (1991) ML3 Users' Guide. London: Institute of Education, University of London
43. Rahim SIA, Cederblad M (1984) Effects of rapid urbanisation on child behaviour and health in a part of Khartoum Sudan. *Journal of Child Psychology and Psychiatry* 25:629-641
44. Rutter M (1989) Isle of Wight revisited: Twenty-five years of child psychiatric epidemiology. *Journal of the American Academy of Child and Adolescent Psychiatry* 28: 633-653
45. Schmidt M, Trueblood W, Merwin M, Durham RL (1994) How much do 'attention' tests tell us? *Archives of Clinical Neuropsychology* 9:383-39
46. Shallice T (1988) From neuropsychology to mental structure. Cambridge: Cambridge University Press
47. Shum DHK, McFarland KA, Bain JD (1990) Construct validity of eight tests of attention: Comparison of normal and closed head injured samples. *The Clinical Neuropsychologist* 4:151-162
48. Verhulst FC, Althaus M (1988) Persistence and change in behavioral/emotional problems reported by parents of children aged 4-14: An epidemiological study. *Acta Psychiatrica Scandinavica* 77:Suppl No 339
49. Verhulst FC, Koot HM (1992) Child psychiatric epidemiology: Concepts methods and findings. London: Sage
50. Verhulst FC, van der Ende J (1992) Six-year developmental course of internalizing and externalizing problem behaviors. *Journal of the American Academy of Child and Adolescent Psychiatry* 31: 941-950
51. Wallage J (1990) Weer samen naar school. Ministry of Education and Science: Zoetermeer